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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,499	03/31/2004	Douglas C. Yoon		4896

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EXAMINER

HO, ALLEN C

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 05/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/813,499

Applicant(s)

YOON ET AL.

Examiner

Allen C. Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, flexibly joined planar radiation detectors as claimed in claim 11 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 9-11 are objected to because of the following informalities:

Claim 11 recites "supporting structures". It is unclear what are the supporting structures.
Appropriate correction is required.

3. Claims 13-15 are objected to because of the following informalities:

Claim 13, line 9, "the" should be replaced by --an--.
Appropriate correction is required.

4. Claim 14 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 14 recites a method step that is already recited in claim 13.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-8 recite "In a digital radiography imaging system ...". It is unclear whether claims 1-8 claim a digital radiography imaging system or a radiation sensor intended for use with a digital radiography imaging system. Furthermore, it is unclear what is meant by a digital

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radiography system since its structure is not defined by the claims. To properly claim a digital radiography imaging system, the structure of the digital radiography imaging system must be claimed in the body of the claims.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dorr (U. S. Patent No. 1,286,251) in view of Schuller *et al.* (U. S. Patent No. 4,941,164).

With regard to claim 1, Dorr disclosed a radiation sensor comprising: a housing (12, 13) containing at least one generally planar radiation detector (14) providing an imaging surface oriented toward a radiation source. The recitation "In a digital radiography imaging system ..." fails to further define the structure of the radiation sensor because it simply recites intended use. Claims 1-8 claim a radiation sensor, not a digital radiography imaging system.

However, Dorr failed to disclose at least one radio-opaque fiduciary element positioned intermediate the radiation source and the surface of the at least one radiation detector.

Schuller *et al.* disclosed at least one radio-opaque fiduciary element (22) positioned intermediate a radiation source and the surface of at least one radiation detector (17a). Schuller *et al.* taught that the at least one radio-opaque fiduciary element could be used to align

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radiographic images taken at different times, thereby facilitating the determination of time evolution of a dental structure.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide at least one radio-opaque fiduciary element positioned intermediate the radiation source and the surface of the at least one radiation detector, since a person would be motivated to follow a dental structure as a function of time by comparing radiographic images taken at different times.

With regard to claim 2, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 1, wherein the housing contains at least two, generally planar, radiation detectors abutting at a non-zero angle to form a faceted, generally contiguous imaging surface (Dorr, page 2, column 1, lines 5-13).

With regard to claim 3, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 2, wherein each adjoining pair of the generally planar detectors abut one another at a fixed angle.

With regard to claim 4, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 2, wherein each pair of adjoining generally planar radiation detectors are flexibly joined so that the angle at which they abut can be changed (a film pack is flexible).

With regard to claim 5, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 2, wherein the fiduciary element is a sphere (Schuller *et al.*, column 5, lines 39-47).

With regard to claim 6, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 1. Claim 6 is rejected with claim 1 since it fails to set forth additional structural limitations.

With regard to claim 7, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 1, further comprising at least one radio-opaque fiduciary element embedded in the housing (Schuller *et al.*, wall 14 form part of the housing).

With regard to claim 8, Dorr and Schuller *et al.* disclosed a radiation sensor as in claim 1, wherein the housing further having a holding tab (10) protruding therefrom for retention between the teeth.

9. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schick (U. S. Patent No. 5,434,418) in view of Dorr (U. S. Patent No. 1,286,251).

With regard to claims 9 and 10, Schick disclosed a radiation sensor comprising: a housing (8) having integrally formed therewith a digital radiation detector (4).

However, Schick failed to disclose two planar digital radiation detectors abutting at a non-zero angle to form a faceted, generally contiguous imaging surface.

Dorr disclosed a film pack (14) that comprises two planar portions abutting at a non-zero angle to form a faceted contiguous imaging surface to accommodate the anatomic curvature of the gum and hard palate anterior to the upper row of teeth (page 2, column 1, lines 5-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a radiation sensor that comprises two planar digital radiation detectors abutting at a non-zero angle, since a person would be motivated to configured the radiation sensor to accommodate the anatomic curvature of the gum and hard palate anterior to the upper row of teeth.

With regard to claim 11, Schick and Dorr disclosed a radiation sensor as in claim 9. However, Schick and Dorr failed to disclose a pair of planar digital detectors flexibly joined.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a pair of planar digital detectors flexibly joined, since a person would be motivated to configure the radiation sensor with adjustability to accommodate various anatomical curves of a patient.

10. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schick (U. S. Patent No. 5,434,418) in view of Dorr (U. S. Patent No. 1,286,251) as applied to claim 9 above, and further in view of Bratslavsky *et al.* (U. S. Patent No. 6,811,312 B2).

With regard to claim 12, Schick and Dorr disclosed a radiation sensor as in claim 9. However, Schick and Dorr failed to disclose a holding tab protruding from the housing.

Bratslavsky *et al.* disclosed a holding tab (16) that is removably attached to a radiation sensor for positioning the radiation sensor relative to teeth.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a holding tab attached to the housing, since a person would be motivated to accurately position the radiation sensor relative to the teeth to be imaged.

11. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (2002).

With regard to claims 13 and 14, Schulze and d'Hoedt disclosed a method for correcting distortions in a radiation sensor used with digital radiography imaging system for intraoral placement in a mouth of a patient for producing radiographs of teeth and their anatomical support structures of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth (p. 37, column 1, lines 30-36), the method comprising the steps of: providing a housing containing at least one, generally planar, radiation detector (CCD image receptor)

providing an imaging surface oriented toward a radiation source, the housing conforming to the anatomical curvatures of the of an average patient (p. 35, column 2, lines 18-26); placing at least one radio-opaque fiduciary element (reference steel balls) of known shape, size, and location intermediate a radiation source (x-ray tube) and the surface of the at least one radiation detector, the at least one fiduciary element casting a projected image on the at least one radiation detector when illuminated by the radiation source; exposing the at least one radiation detector and the at least one fiduciary element to the radiation source to project an image of the at least one fiduciary element and the teeth and supporting structures onto the surface of the at least one radiation detector; capturing and digitizing (with a personal computer) the data representing the projected image of the fiduciary element, teeth, and their anatomical supporting structures images of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth on the surface of the at least one radiation detector produced by the radiation detector (p. 35, column 2, lines 26-36); analyzing the digitized image data to determine the distortion of the projected fiduciary image onto the surface of the at least one radiation detector due to the non-perpendicularity of the radiation source with respect to the surface of the at least one radiation detectors from that of an ideal fiduciary image projected onto the surfaces of the at least one radiation detectors defined by exposure of the fiduciary element to a radiation source perpendicular to the surface of the at least one radiation detectors (p. 36-38).

However, although Schulze and d'Hoedt suggested correcting the distortion (p. 32, conclusions), Schulze and d'Hoedt failed to teach the steps of determining a corrective transformation that transforms the distorted projected fiduciary image to that of the ideal fiduciary image, and apply the corrective transformation to the remaining digitized image data in

order to transform the distorted projected image of the teeth and their anatomical supporting structures of bone, ligaments and gingiva around the root and cervical region of the tooth to that of an ideal projected image of the teeth and their anatomical supporting structures of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to determine a corrective transformation that transforms the distorted projected fiduciary image to that of the ideal fiduciary image, and apply the corrective transformation to the remaining digitized image data, since a person would be motivated to obtain a correct analysis based on undistorted images.

12. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (2002) as applied to claim 13 above, and further in view of Nambu *et al.* (U. S. Patent No. 6,196,715 B1).

With regard to claim 15, Schulze and d'Hoedt disclosed a method as in claim 14. However, Schulze and d'Hoedt failed to teach a step of embedding on, or placing in or under the housing at least one radio-opaque fiduciary element.

Nambu *et al.* disclosed a method that provides at least one radio-opaque fiduciary element (M) on the housing of a radiation detector (14) (column 30, lines 13-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to embed the at least one radio-opaque fiduciary element on or in the housing of the at least one radiation detector, since a person would be motivated to have a fixed spatial relationship between the at least one radio-opaque fiduciary element and the at least one radiation detector, which would simplify the analysis by removing some uncertainties in the

analysis. Furthermore, having an *in situ* fiduciary element means that one is not required to provide additional structure to support it, thus reducing the overall complexity of the system.

Response to Arguments

13. Applicant's arguments filed 03 March 2006 with respect to the specification have been fully considered and are persuasive. The objections of the specification have been withdrawn.

14. Applicant's arguments filed 03 March 2006 with respect to claim 9 have been fully considered and are persuasive. The objection of claim 9 has been withdrawn.

15. Applicant's arguments filed 03 March 2006 with respect to claim 13 have been fully considered and are persuasive. The objection of claim 13 has been withdrawn.

16. Applicant's arguments filed 03 March 2006 with respect to claims 13-15 have been fully considered and are persuasive. The rejection of claims 13-15 under 35 U.S.C. 112, second paragraph, has been withdrawn.

17. Applicant's arguments filed 03 March 2006 have been fully considered but they are not persuasive.

With regard to claims 1-8, applicants' arguments are not persuasive because they are not directed to the structure of the radiator sensor. The features that are not related to the structure of the radiation sensor are not given patentable weight. Although features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. MPEP § 2114. The only structure claimed in claim 1 is a radiation sensor that comprises a housing containing at least one generally planar radiation detector and at least one radio-opaque fiduciary element.

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18. Applicant's arguments filed 03 March 2006 with respect to the rejection(s) of claim(s) 9-11 under 35 U.S.C. 102(b) as being anticipated by Dorr (U. S. Patent No. 1,286,251) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Schick (U. S. Patent No. 5,434,418) and Dorr (U. S. Patent No. 1,286,251).

Dorr failed to disclose a housing having integrally formed therewith at least two, generally planar, digital radiation detectors.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Fabian (U. S. Patent No. 5,166,967) disclosed an in situ marker for a dental x-ray film.
- (2) Ralf Schulze *et al.*, "Determination of projection geometry from quantitative assessment of the distortion of spherical references in single-view projection radiography", Med. Phys. 31(10), 2849-2854 (2004).

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen C. Ho, Ph.D.
Primary Examiner
Art Unit 2882

19 May 2006